

COSMOPOLITAN UNIT

**APPROVAL OF THE APPLICATION TO FORM THE
COMBINED STARICHKOF SAND AND
HEMLOCK FORMATION PARTICIPATING AREA**

Findings and Decision of the Director
of the Division of Oil and Gas
Under a Delegation of Authority
from the Commissioner of the State of Alaska
Department of Natural Resources

August 29, 2017

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I. INTRODUCTION AND DECISION SUMMARY

The Department of Natural Resources, Division of Oil and Gas (Division) received the Cosmopolitan Unit (CU) Application to Form Combined Participating Area Starichkof Sand and Hemlock Formation Cook Inlet, Alaska (Application) on July 7, 2017 from the CU Operator, BlueCrest Alaska Operating LLC (BlueCrest). The Division met with BlueCrest on May 16, 2017 for a technical presentation on the merits of the Application.

A participating area “may include only the land reasonably known to be underlain by hydrocarbons and known or reasonably estimated through use of geological, geophysical, or engineering data to be capable of producing or contributing to production of hydrocarbons in paying quantities” 11 AAC 83.351(a).

BlueCrest submitted confidential and public information in the Application. The confidential economic, geological, geophysical, and engineering data indicate that the acreage proposed for inclusion in the Combined Starichkof Hemlock Participating Area (SHPA) is producing or contributing to production of hydrocarbons in paying quantities, or is reasonably estimated to be capable of producing or contributing to production of hydrocarbons in paying quantities.

The Division finds that the formation of the SHPA promotes conservation of all natural resources, promotes the prevention of economic and physical waste, and provides for the protection of all parties of interest, including the State. AS 38.05.180(p); 11 AAC 83.303. I approve the Application under the terms and conditions of Section IV. The effective date of the formation of the SHPA is March 1, 2016, the first month of production.

II. APPLICATION AND LEASE SUMMARY

The Application for expansion includes Exhibit C (Attachment 1), legally describing the proposed participating area, its leases, and ownership interests; and Exhibit D (Attachment 2), a map of the proposed participating area. The proposed SHPA includes 3,450 acres. BlueCrest has proposed production be allocated to the SHPA tracts based on original oil in place and the boundary determined by the expected drainage area of the completed development.

III. DISCUSSION OF DECISION CRITERIA

The DNR Commissioner (Commissioner) reviews applications related to units, including participating area formations, expansions and contractions, under 11 AAC 83.303–11 AAC 83.395. By memorandum dated September 30, 1999, the Commissioner approved a revision of Department Order 003 and delegated this authority to the Division Director. The Division’s review of the Application is based on the criteria set out in 11 AAC 83.303 (a) and (b). A discussion of the subsection (b) criteria, as they apply to the Application, is set out directly below, followed by a discussion of the subsection (a) criteria. Analysis and discussion of subsection (b) requirements precedes and supports the findings under subsection (a).

A. Decision Criteria considered under 11 AAC 83.303(b)

1. Environmental Costs and Benefits

Approval of the SHPA formation has no direct environmental impact. This decision is an administrative action and does not authorize any on-the-ground activity. The Unit Operator must obtain approval of a plan of operations from the State and permits from various agencies on State leases before drilling a well or wells or initiating development activities to produce reservoirs within the unit area. 11 AAC 83.346. Potential effects on the environment are analyzed when permits to conduct exploration or development in the unit area are reviewed. BlueCrest has obtained the required permits for the current SHPA wells and is operating under an approved plan of operations and plan of development. DNR considers environmental issues during the lease sale process and the unit plan of operations approval process.

2. Geologic and Engineering Characteristics and Prior Exploration and Development Activities of the Proposed Starichkof Hemlock Participating Area

Prior Exploration and Development activities

The prospect currently referred to as Cosmopolitan is a faulted anticline identified using 2-D seismic data in the 1960s and initially tested by two wells. The first well, Pennzoil Starichkof State 1, was drilled in 1967 from an offshore location and penetrated a hydrocarbon-bearing Lower Tyonek Formation section between 6,740 and 7,005 feet Measured Depth (MD), informally referred to as the Starichkof oil zone.

A second well, Pennzoil Starichkof State Unit 1, was drilled later in 1967. In that well the Lower Tyonek reservoir interval proved wet. The Starichkof State Unit 1 well was plugged and abandoned in 1967. The Starichkof State 1 well was suspended, certified later as capable of production in paying quantities, and is now listed by the Alaska Oil and Gas Conservation Commission as plugged and abandoned.

In November 2001, DNR approved formation of the first Cosmopolitan Unit and additional exploration work was conducted. That year, Phillips drilled a deviated onshore well, the Hansen 1, that confirmed the previously discovered Starichkof oil zone and found oil in the Hemlock Formation. This well tested flow rates averaging 500 barrels of oil per day (BOPD)—380 BOPD from the Hemlock and 125 BOPD from the Starichkof.

In 2003, ConocoPhillips drilled the Hansen 1A well, which was a sidetrack from the Hansen 1 well bore. Hansen 1A was flow tested in the Starichkof and Hemlock zones at rates averaging 765 BOPD. The Hansen 1A well was completed with a slotted liner and no added perforations. The well had an extended production flow test of 99.5 hours on June 13, 2003 within the Starichkof and Hemlock zones using a jet pump, and yielded 3,673 barrels of oil, 765 thousand cubic feet of gas, and no water through a 66/64 choke. The flowing tubing pressure was measured at 175 psi and the Gas-Oil Ratio (GOR) was calculated at 208 SCF/bbl. The calculated 24-hour test rate is approximately 886 BOPD and 185 thousand cubic feet per day (MCFD).

In 2005, Pioneer and ConocoPhillips acquired 3D seismic data that better defined the geologic structure of the accumulation and identified additional drilling locations. Pioneer took over as operator of the Cosmopolitan Unit and drilled a sidetrack from the Hansen 1A well bore in 2007. This well, Hansen 1AL1, tested the Starichkof target at an oil rate of 285 BOPD and a gas rate of 1.15 million cubic feet per day (MMCFD). Over 33,000 barrels of oil were produced from Hansen 1AL1.

In 2011, Pioneer voluntarily terminated the Cosmopolitan Unit, but retained the leases in the former unit that had wells certified as capable of production in paying quantities.

The Cosmopolitan State 1 well was then drilled by Buccaneer in 2013 and discovered new potentially productive oil and gas zones in the Hemlock and Tyonek. This vertical well was drilled through the crest of structure, identified from 3D seismic data, to 7,599 feet MD. Two Tyonek gas zones were tested at 4,300 feet MD and 5,500 feet MD, with maximum flow rates of 7.3 MMCFD and 7.2 MMCFD, respectively. Four-point tests were performed to estimate absolute open flow potential (AOF) for both gas zones. Both gas zones had a calculated absolute open flow potential (AOF) of 9.4 MMCFD. Both gas zones also tested no water.

Structure of the Cosmopolitan Area

The Cosmopolitan structure is a NE/SW doubly plunging asymmetric anticline bounded along its west flank by a high angle reverse fault that strikes parallel to the structural axis. Associated tear faults with normal throw cut the northern and southern portions of the feature. This structure, which is four and one-half miles by two miles in size, has approximately 600 feet of vertical closure over an area of over 6,000 acres at the Starichkof sand.

Approximately 8,600 feet of Tertiary age Kenai Group non-marine sedimentary rocks are present at Cosmopolitan. The Kenai Group is represented here by approximately 1,000 feet of the Beluga Formation, characterized by thin bedded sandstones, coals, siltstone, and silty shale intervals that were deposited in a braided stream environment. The overlying Sterling Formation is not present and has also been removed by erosion.

Unconformably, underlying the Beluga sequence is approximately 6,000 feet of Miocene age Tyonek Formation, a basin wide series of fluvial conglomerate, conglomeratic sandstone, sandstone, coal, siltstone and shale that represent deposition in meandering streams, associated fluvial sediments and lacustrine environments. The Tyonek can be divided into an upper section that contains gas productive sandstones and the lower Starichkof sand interval, which is the oil discovery zone found in 1967 by Pennzoil in the Starichkof State 1 well.

Immediately underlying the Tyonek Formation is approximately 500 feet of the Oligocene Hemlock Conglomerate. It generally consists of medium- to coarse-grained, thick bedded sandstone with substantial conglomeratic beds and lenses. It was drill stem tested in the Starichkof State 1 well and recovered brackish water from two separate intervals beneath the oil/water contact. More recent drill stem tests recovered water-free oil in higher structural positions.

Underlying the Hemlock is the Paleocene to Eocene age West Foreland Formation, a roughly 1,100-foot-thick sequence of volcanic tuffs and volcanoclastic sandstone and siltstone lacking oil or gas shows. It is extensively cemented by authigenic clays and zeolites and is devoid of any reservoir-quality rocks.

Current Activity and Production

Hansen 16 was spud on November 29, 2016 by new unit operator, BlueCrest. The well was then completed March 11, 2017. Production and well testing results are currently pending.

The Division approved Blue Crest's Cosmopolitan Unit Application in 2015. Blue Crest has made significant progress in onshore pad/facility construction and permitting and continues oil production from the Hansen 1A well.

Conclusion

BlueCrest submitted sufficient technical data to support formation of the SHPA. The submitted data included geologic cross-sections, structure maps, electric log analyses, and interpreted seismic data. The Division's assessment of this data and information supports the approval of the proposed participating area, the extent of the area, and the allocation factors. As noted in the lease summary, the areal extent of the SHPA is defined by the drainage area of planned and drilled wells. The vertical extent of the SHPA is defined by the base of the Hemlock and top of the Starichkof sand. BlueCrest chose to allocate production based on an original oil in place basis.

3. Plans of Development

The Division approved the Third Plan of Development (POD) for the CU on November 7, 2016 for the period January 1, 2017 through December 31, 2017. The plan described completing construction of a new drilling rig and the drilling of up to three wells, five production laterals, and one disposal well. BlueCrest was actively drilling and producing when the Application was submitted. On August 15, 2017 BlueCrest submitted a letter to the Division describing a pause in drilling so that the previously drilled wells could be produced and evaluated before drilling is resumed. BlueCrest stated "We anticipate a return to drilling in several months, however are working to even accelerate this return to drilling. We want to take a very disciplined and calculated approach in exploring our options on how to best drill and produce this field."

4. The Economic Costs and Benefits to the State and Other Relevant Factors

The revised SHPA will provide economic benefits to the State through royalty and tax payments on production. There is no immediate royalty or tax benefit to the State because some of the acreage is already producing or contributing to production. However, formation of the SHPA promotes the economic and physical recovery of hydrocarbons, which will provide economic benefits through royalty and tax payments and increased employment opportunities.

The allocation of production under the approved Exhibit C for the SHPA maximizes oil and gas recovery, promotes conservation, prevents waste, and protects all the parties of interest.

B. Decision Criteria considered under 11 AAC 83.303(a)

1. Promote the Conservation of All Natural Resources

The unitization of oil and gas reservoirs and the expansion and contraction of participating areas within unit areas to develop hydrocarbon-bearing reservoirs are well-accepted means of hydrocarbon conservation. Expansion and contraction of a participating area within an existing unit, with development occurring under the terms of a unit agreement, promotes efficient evaluation and development of the State's oil and gas, and minimizes impacts to the area's cultural, biological, and environmental resources.

2. The Prevention of Economic and Physical Waste

The acreage within the proposed SHPA already produces and is reported as a tract operation and allocated to two leases. Approval of the Application will prevent economic and physical waste because the approval will allocate production revenue under the approved SHPA tract allocations, equitably allocating production revenues among several tracts. Approval of the SHPA will not result in economic waste given the current well spacing, market demand, and anticipated production rates. Annual approval of the Cosmopolitan Unit development activities as described in future PODs must also provide for the prevention of economic and physical waste.

3. The Protection of All Parties of Interest, Including the State

A participating area "may include only the land reasonably known to be underlain by hydrocarbons and known or reasonably estimated through use of geological, geophysical, or engineering data to be capable of producing or contributing to production of hydrocarbons in paying quantities" 11 AAC 83.351(a).

The Division reviewed confidential geophysical, geological, and engineering data to determine the portion of the acreage proposed for inclusion in the SHPA. BlueCrest has demonstrated that the acreage proposed for the SHPA is "reasonably estimated" to be capable of producing or contributing to production of hydrocarbons in paying quantities.

BlueCrest has proposed production be allocated to the SHPA tracts based on original oil in place and the boundary determined by the expected drainage area of the completed development. Some of the acreage in the SHPA area is already producing, having been drilled and produced as tract operations. However, other portions of the SHPA area will be drilled in the future. These future wells are planned, but the possibility remains they may not be drilled, or the undrilled area may not be productive. However, participating areas are intended for sustained production. Therefore, the Division expects BlueCrest will continue drilling operations in a prudent manor to fully develop the SHPA. Article 9.6 of the CU Agreement requires Unit Operations be maintained with lapses of no more than 180 days per lapse between operations unless approved by the

Commissioner. If portions of the SHPA are proven to be unproductive, or after a reasonable amount of time they are not developed, the Division expects BlueCrest will apply to adjust the SHPA boundary. If BlueCrest does not act in a prudent manor the Division may require increases in the rate of development as described in Article 9.7 of the CU Agreement.

The people of Alaska have an interest in the development of the State's oil and gas resources to maximize the economic and physical recovery of the resources. AS 38.05.180(a). Approval of annually-updated PODs provides for continued review and approval of BlueCrest's plans to develop the SHPA and CU in a manner that will maximize economic and physical recovery.

IV. FINDINGS AND DECISION

A. The Conservation of All Natural Resources

1. The SHPA will provide for continued development of the participating area under the CU Agreement and will maximize the efficient recovery of oil and gas and minimize the adverse impacts on the surface and other resources, including hydrocarbons, gravel, sand, water, wetlands, and valuable habitat.

B. The Prevention of Economic and Physical Waste

1. BlueCrest submitted geological, geophysical, and engineering data to the Division in support of the Application, as approved. The Division determined the SHPA area is "reasonably estimated" to be capable of producing or contributing to production in paying quantities.
2. The available geological, geophysical, and engineering data justify including the lands described in Attachment 1 of this decision.
3. The production of hydrocarbons through the existing production and processing facilities reduces the environmental impact of the additional production. Using existing facilities will avoid unnecessary duplication of development efforts on and beneath the surface.

C. The Protection of All Parties in Interest, Including the State

1. The economic, geological, geophysical, and engineering data that BlueCrest provided reasonably justify the inclusion of the acreage into the revised SHPA under the terms of the applicable regulations governing formation, expansion, and operation of oil and gas units and participating areas (11 AAC 83.301–11 AAC 83.395) and the terms and conditions under which these lands were leased from the State.
2. The SHPA revision provides for the equitable division of costs and an equitable allocation of produced hydrocarbons under a POD designed to maximize physical and economic recovery from the reservoirs within the approved participating areas. The allocations of production and costs for the tracts within the revised SHPA are approved, effective March 1, 2016.

- a. Accounting Unit code CP01 is terminated effective March 1, 2016. BlueCrest shall submit revised operator reports and the lessees shall submit revised royalty reports back to the April 1, 2016 production month, zeroing out production under royalty accounting unit code CP01 and including these volumes into the Starichkof Hemlock PA (royalty accounting unit code **CPSH**) as set forth in the approved SHPA tract allocation schedule.
 - b. BlueCrest shall submit the revised reports within 60 days after the approval of the revision of the SHPA.
2. To the extent formation of the SHPA affects the rentals for leases within the PA, this decision affects rentals due after the date of this decision only and not any prior rental payments.

For the reasons discussed in this Findings and Decision, I hereby approve the SHPA formation.

An eligible person affected by this decision may appeal it, in accordance with 11 AAC 02. Any appeal must be received within 20 calendar days after the date of “issuance” of this decision, as defined in 11 AAC 02.040(c) and (d), and may be mailed or delivered to Andrew T. Mack, Commissioner, Department of Natural Resources, 550 W. 7th Avenue, Suite 1400, Anchorage, Alaska 99501; faxed to 1-907-269-8918; or sent by electronic mail to dnr.appeals@alaska.gov. This decision takes effect immediately. An eligible person must first appeal this decision in accordance with 11 AAC 02 before appealing this decision to Superior Court. A copy of 11 AAC 02 may be obtained from any regional information office of the Department of Natural Resources.

If you have any questions regarding this decision, contact Kevin Pike with the Division at 907-269-8451, or by email at kevin.pike@alaska.gov.

Sincerely,



Chantal Walsh
Director

Aug 29, 2017
Date

V. Attachments

1. Cosmopolitan Unit Approved Exhibit C
Description of lands within the approved participating area
2. Cosmopolitan Unit Approved Exhibit D
Map of approved participating area

Attachment 1: Approved Exhibit C
Description of lands within the approved participating area

Cosmopolitan Unit
BlueCrest Alaska Operating LLC

Tract	Legal Description	Acreage	Tract %*	Lease	Mineral Owner	Interest	Royalty	ORRI Owner	ORRI %	Working Interest Owner	WIO %
2	T3S, R 15W, S.M. Sec. 20: SE4SE4SE4; Sec. 21: S2E4NE4, SE4NE4, S2SW4NE4, NE4SW4NE4, SE4, S2SW4, NE4SW4, SE4NW4SW4, and SE4SE4NW4; Sec. 28: Protracted, All Sec. 29: E2NE4, SW4NE4, SE4NW4NE4, SE4, SE4SE4SW4; Sec. 32: E2, SE4SW4, N2SE4, E2NE4SW4, E2E2NW4; Sec. 33: W1/2.	10.00 390.00 640.00 300.00 420.00 320.00 <u>2,080.00</u>	70.18607%	ADL 384403	State of Alaska	100%	12.50%	Robert C. Warthen SPC, LLC Briggs V. Nesmith Robert A. Chaffin Danny S. Davis Brian L. Crouch Flintlock Ventures LP Chase Morsey Living Trust Blocker Interests, Ltd. Donkel Oil & Gas, LLC Cook Inlet Energy, LLC ConocoPhillips Alaska, Inc. BlueCrest Energy Inc. Cade Family III	0.1666665% 1.3333300% 0.1750000% 0.2626000% 0.3207300% 0.1666665% 0.4083300% 0.1750000% 0.9916700% 0.1250000% 0.4375000% 2.0000000% 0.8750000% 0.3750000% <u>7.8124930%</u>	BlueCrest Energy Inc.	100%
3	T3S, R 15W, S.M. Sec. 22: S2SW4NW4, NW4SW4NW4, W2SW4, SW4NE4SW4, W2SE4SW4, and SE4SE4SW4; Sec. 27: N2NW4, SW4NW4, N2NW4SW4, SW4NW4SW4, and NW4SW4SW4.	150.00 <u>160.00</u> <u>310.00</u>	5.99224%	ADL 391903	State of Alaska	100%	12.50%	Apache Alaska Corporation	3.5000000%	BlueCrest Energy Inc.	100%
4	T3S, R 15W, S.M. Sec. 33: W2NE4, W2NE4NE4, NE4NE4NE4, NW4SE4NE4, NW4SE4, N2SW4SE4, and SW4SW4SE4. T4S, R15W, S. M. Sec. 4: W2NW4NE4, NW4SW4, W2NE4SW4, N2SW4SW4, SW4SW4SW4, and NW4.	190.00 <u>270.00</u> <u>460.00</u>	8.81044%	ADL 18790	State of Alaska	100%	12.50%	Osler C. Hutson Metro National Bank Nugent T. Brasher, Jr. Jerry F. Brasher Melanie Mathis Cuttriss-Curtis Marilyn F. Mathis Machelle Mathis Knight Melissa Mathis Carroll ConocoPhillips, Inc. (LL&E) Devon Energy Production Company, L.P. Exxon/Mobil (XH, LLC) JoAnne L. Best Rosewood Resources, Inc. ExxonMobil (Mobil E&P) ConocoPhillips Alaska, Inc. Glacier Energy, LLC (CIE) Donkel Oil & Gas, LLC BlueCrest Energy Inc. Cade Family III	0.1875000% 0.3750000% 0.1875000% 0.1875000% 0.0937500% 0.0937500% 0.0937500% 0.0937500% 0.5000000% 1.0000000% 0.041170% 0.1875000% 0.4963200% 2.6250000% 2.0000000% 0.4187500% 0.1250000% 0.8750000% 0.3750000% <u>9.9591870%</u>	BlueCrest Energy Inc.	100%

[illegible]

Attachment 2: Approved Exhibit D
Map of approved participating area

BlueCrest Energy Inc.

Proposed Cosmopolitan
Participating Area Map

Exhibit D

Combined Starichkof and
Hemlock Reservoirs

July 7, 2017

